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TRANSPORT CANADA

INTEGRATED HUMAN RESOURCE PLANNING AND DEVELOPMENT

August 1982

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TP&C

FOREWARD

In October 1981 Transport Canada commenced a project to design and implement a Human Resource Planning (HRP) process.

The consulting firm of Towers, Perrin, Forster & Crosby was engaged to assist with the project. The first phase of the project defined the scope of the task and provided a schedule for the work. The second phase, which was the bulk of the work, used the Transport Canada Engineering group as the subject of a pilot project to devise a human resource planning and development approach for the Department. The third and final phase, the subject of this document, was expected to describe the general application of the HPR&D process as it might be applied throughout Transport Canada.

We would like to express our appreciation for the cooperation and professionalism displayed by the members of Transport Canada who were part of the project. These included Judith Bergin, Denis Corbeil, Cliff Cullen, Louis Huneault, Jacqueline Kelly, Jeff Norton and, in particular, the Project Leader, Gilles Bilodeau.

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I. INTRODUCTION

There are two keys to successful implementation of human resource planning and development processes throughout an organization:

- o A close relationship or linkage between human resource planning and strategic planning, and,
- o Clearly defined and accepted human resource planning and development practices at the line manager level.

Where human resource planning is seen as a creature of the personnel department, or as "paperwork" which does not provide management information or assistance, it soon receives less and less priority until, robbed of its effectiveness, it is discarded.

A recent publication by the Conference Board of Canada([1]) identified seven underlying or universal principles related to effective integration of human resource planning with strategic planning. The seven form a useful preamble to this document. The principles are also the conclusions of the Conference Board study and state that effective human resource management, in the context of overall business planning and management, is facilitated to the extent that:

1. There is an overall corporate purpose and that the human resource dimensions of that purpose are evident.

([1]) Nininger, James R., Managing Human Resources: A Strategic Perspective, A Report Published by The Compensation Research Centre of the Conference Board of Canada, April 1982.

2. A process of developing strategy within the organization exists and is understood and that there is explicit consideration of human resource dimensions.
3. Effective linkages exist on a continuing basis to ensure the integration of human resource considerations with the organizational decision-making processes.
4. The office of the senior decision-maker in the organization provides the climate for integrating human resource considerations with the needs of the organization.
5. The organization at all levels establishes responsibility and accountability for human resource management.
6. Initiatives in the management of human resources are relevant to the central purpose of the organization.
7. The responsibility to identify and interact in the social, political, technological and economic environments in which the organization is and will be existing is included.

The purpose of this document is to describe the general applicability of the HRP&D process developed using the engineers in Transport Canada as a pilot project.(2) Although the report was written in March of 1982, prior to the April publication of the Conference Board report, the action plan which is contained in the TPF&C report closely parallels the seven principles just described.

(2) The TPF&C Report on the Second Phase of the Human Resource Planning Project undertaken on behalf of Transport Canada.

II. AN INTEGRATED APPROACH TO HUMAN RESOURCE PLANNING

The term "integrated approach" demands an explanation. In our view, human resource planning is a management process, not simply one of the personnel staff functions. It is, in essence, the process of analyzing an organization's human resource needs under changing conditions, and developing the activities necessary to satisfy those needs.

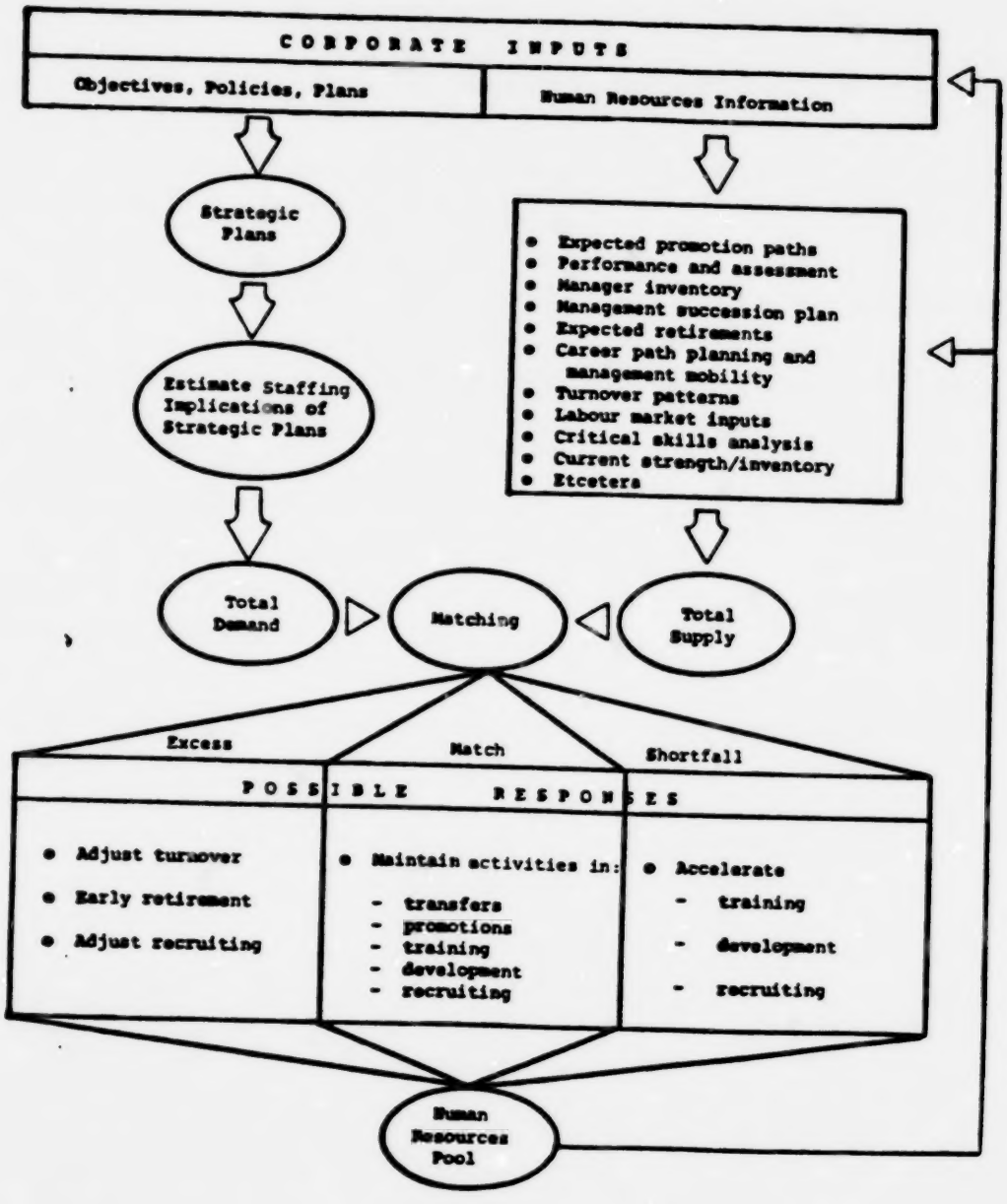
All plans, whether we recognize them or not, respond to four simple questions:

- o WHAT do we want to do?
- o WHEN do we want to do it?
- o HOW can we achieve our goal?
- o HOW will we know that we are making progress?

Human resource planning seeks answers to these questions, and as a result is closely linked with other plans taking shape within the organization. The answers often become complex and difficult. It is frequently part of, and must be dependent upon, some of these other planning activities, in particular, the long term or strategic plans of the organization. In this sense, "strategic planning" should be taken to mean planning for the central ongoing purpose of the organization whether it be a private sector company, a government department, or a non-profit association.

The human resources planning and development model that was the basis of the Transport Canada study is shown in diagramatic form on the following page.

FIGURE 1: HUMAN RESOURCES PLANNING AND DEVELOPMENT MODEL



This is a supply/demand approach to the development of possible scenarios facing the organization. It shows three possibilities, i.e. an excess, a short fall, or a close match, between the demand for and the supply of human resources. In this way critical human resources problems emerge from an estimate of the staffing implications attached to the organizations' strategic plan.

An integrated approach, therefore, includes these steps:

- Development of the total demand for human resources over a time period matching Transport Canada's strategic plan.

- Development of the total supply from all possible internal and external sources over a similar period of time. This implies a dependence upon good human resource information internally and the ability to develop external labour market scenarios.

- Demand and supply matching to produce future human resource scenarios.

- Short and long term action planning to bring the resource pool into balance with demand.

These tasks are the four major phases of a human resources planning effort. In most instances they will create work in other aspects of HRM at the department level as responses to the action plan are undertaken.

III. THE LINKAGE TO STRATEGIC PLANNING

The general applicability and effectiveness of human resource planning processes will be frustrated if they are not part of the overall planning process. The Transport Canada planning process from strategy to budget is depicted as a flow chart on the following page (Figure 2). The following paragraphs describe the modifications which would ensure integration.

Strategic Planning

The strategic planning process emanates from the Ministry of State for Economic Development (MSED), a policy committee of Cabinet. Currently the strategic concepts of MSED take shape in the form of Strategic Planning Guidelines prepared by the Assistant Deputy Minister Strategic Planning (ADMSP). In line with our recommendations in the Phase Two report, the preparation of the Strategic Planning Guidelines should be modified to take into account the human resource factors.

Specifically, we recommend that a permanent Strategic Planning Task Force be put into place and that its membership include the ADM Personnel or a designate (see Figure 3). The responsibility of this individual, with the support of the Human Resource Planning Group, would be to undertake internal and external conditions analyses and to ensure that these form part of the thinking in the preparation of the Strategic Planning Guidelines. Internally, this would include a review of organizational structure, personnel policies, changes in service levels, staffing goals and objectives, the expected effects of technology, and so forth. Externally, the conditions analysis should include an examination of socioeconomic trends, competition from other sectors, changes in the work force, changes in regulations or any other factor likely to affect the supply/demand situation for human resources.

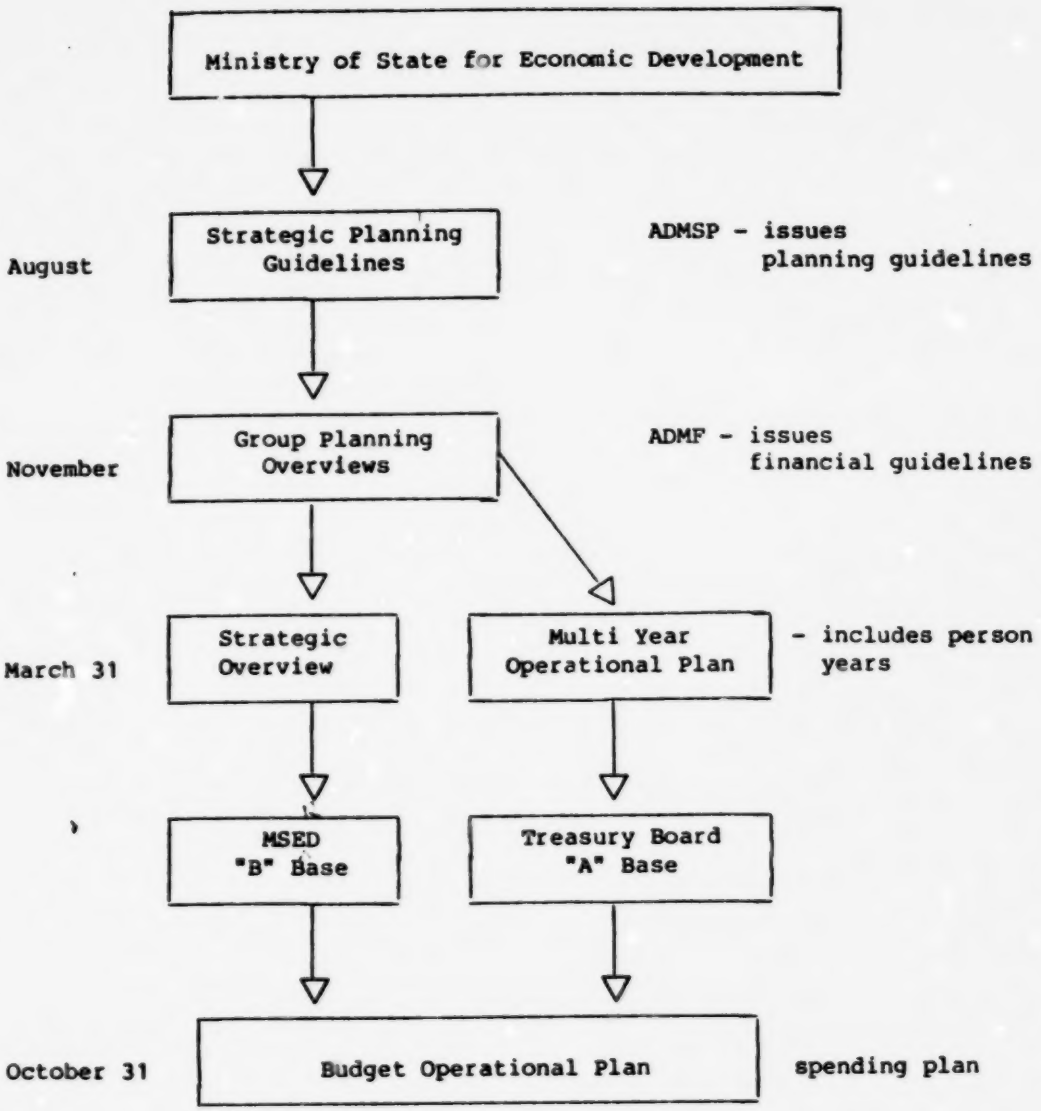


Figure 2: The Transport Canada Planning Process
From Strategy to Budget

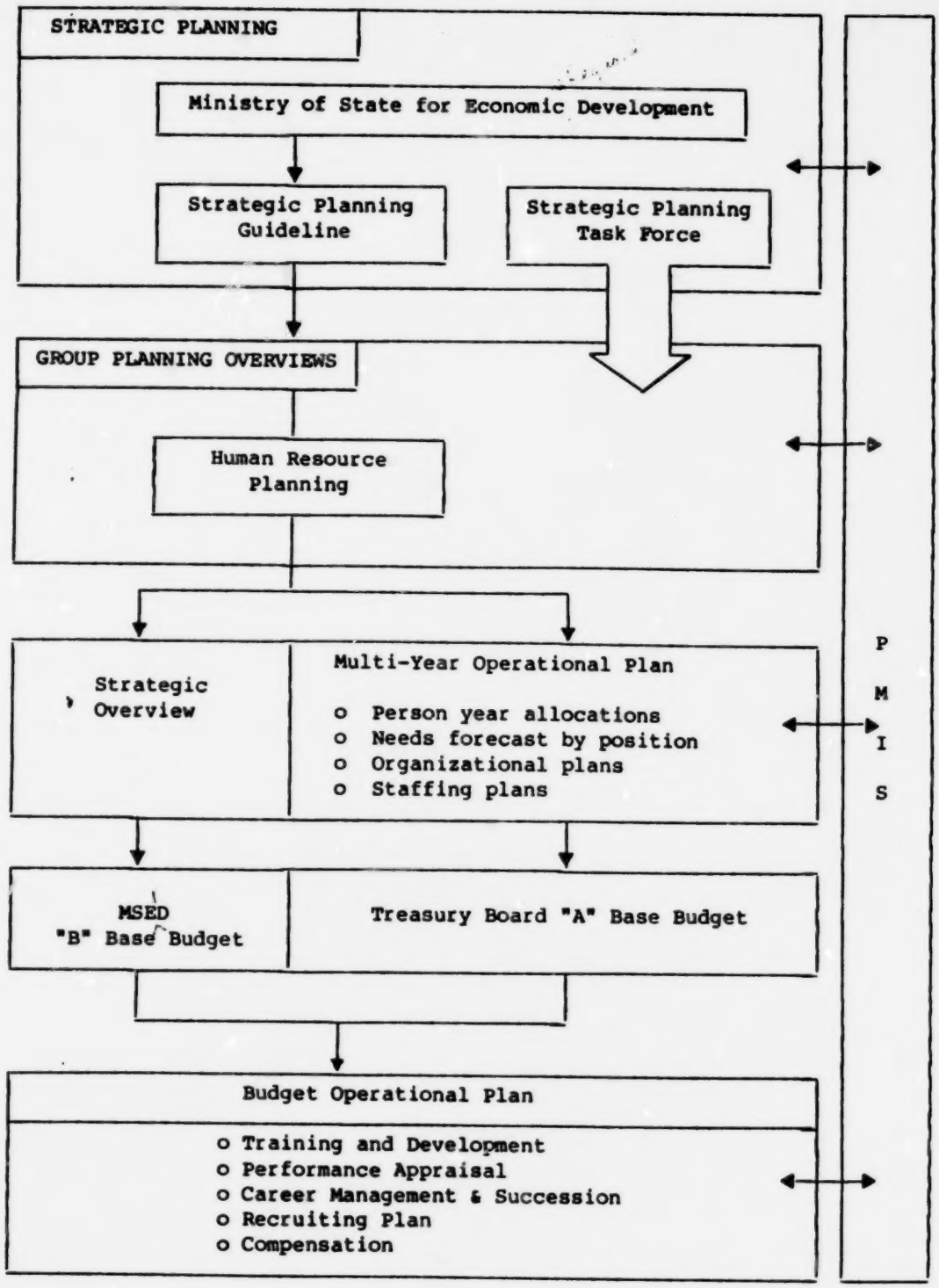

STRATEGIC PLANNING
Ministry of State for Economic Development
Strategic Planning Guideline
Strategic Planning Task Force
GROUP PLANNING OVERVIEWS
Human Resource Planning
Strategic Overview
Multi-Year Operational Plan
o Person year allocations
o Needs forecast by position
o Organizational plans
o Staffing plans
P
M
I
S
MSED "B" Base Budget
Treasury Board "A" Base Budget
Budget Operational Plan
o Training and Development
o Performance Appraisal
o Career Management & Succession
o Recruiting Plan
o Compensation

Figure 3

A second task of the Human Resource Planning representative on the Strategic Planning Task Force would be to issue the Human Resource Planning Guide. The purpose of the Human Resource Planning Guide is to obtain line management involvement in the overall process and to ensure that localized information or factors are not omitted. A suggested format is included as Appendix One. Part of this feedback is a critique of the forecast of supply and demand as generated by the model contained in the Personnel Management Information System (PMIS).

Group Planning Overview (GPO)

Under the approach in Figure 2 the ADM Finance issues financial guidelines as one major determinant in the development of the Group Planning Overview. The HRP linkage would require the ADM Personnel to issue human resource guidelines which would become a similar basic input to the GPO process. Two major inputs to these guidelines are needed. First, there is the input from the HRP Guides which were issued to line managers at the start of the Strategic Planning process and which have been completed and returned and, second, the Human Resource Planning forecasts and reports from PMIS. The Human Resource Planning Guides will provide local or departmental information and opinions on staffing levels, staffing mix, organization and job design, available or projected resources, and net requirements to meet departmental objectives.

The PMIS inputs to the preparation of GPO's should provide a complete statistical description of the work force as it exists at the start of the strategic planning process. Examples of typical reports are:

- o Age or other demographic variable by organization unit.
- o Eligible retirements based on age and length of government service.
- o Promotion readiness reports.
- o Retention curve analysis reports.

- o Compensation and benefits reports.
- o Key position succession plan.
- o Turnover characteristics analysis.
- o Human resource forecast (supply and demand).

The latter item is the forecast by level within generic job families generated by the model implemented in the engineering pilot study and operated as part of PMIS. The forecast process is described in more detail in Chapter IV.

Multi-Year Operational Plan

The multi-year operational plan currently includes person year estimates at a high level of aggregation. To be useful, the Group Planning Overviews must be in sufficient detail to allow a supply/demand forecast on a position by position basis for the period covered by the operational plan.

These forecasts are the output of the human resource forecasting model as modified by "local information and opinion" obtained from the HRP Guides.

Treasury Board "A" Base Budget

There are no major changes needed for this part of the process. However, the Treasury Board "A" Base Budget must be more specific in terms of its allocation of financial support to individual human resource processes. For example, the need to undertake a specific staffing action should be apparent and the budget should be allocated to this action rather than as part of a collective total. Only in this way can the consequence of changing a budget allocation become apparent.

Budget Operational Plan

The human resource management aspect of translating the base budget into a Budget Operational Plan is the consideration of specific human resource management processes and their particular budgets. It is vital that the long-term or strategic implications of changes in an operational budget be apparent. In particular, the processes of recruiting, career planning, compensation, and training and development have significant long-term effects which can be missed or ignored. These are annual activities and require specific annual spending plans to meet objectives originating in the long term strategic plan.

Personnel Management Information System (PMIS)

Planning starts with data and the HRP process needs continued support from the Personnel Management Information System. There are two key planning aspects to this system.

First, there are statistical descriptions of the work force as described in the section on the Group Planning Overviews. Eight typical reports are suggested but many organizations routinely request and use 25 or 30 varieties of reports to describe the work force adequately as a task force undertakes the preparation of a strategic plan.

The second aspect of PMIS is the mathematical model which it contains. The strength of this model is not its ability to provide a totally accurate prediction. By their nature, predictions are based on assumptions and these are judgmental in nature. The output of the model, therefore, can never be better than the collective wisdom of the assumptions upon which it is built. The true strength of the model is the manner in which it can describe a variety of scenarios combining various rates of growth or decline, differing promotion policies, attrition rates, or other factors which affect the flow of people into, through, and out of the organization.

With the completion of the work to define generic job families across the Ministry, the model will be able to provide the Strategic Planning Task Force with descriptive scenarios for consideration during the preparation of the Strategic Planning Guidelines or the Group Planning Overviews.

The model is, in the short term, by the inability of Transport Canada to provide a historical data base of sufficient duration to provide accurate projections. As experience with the model is accumulated, the Strategic Planning Task Force will be able to exploit its full potential.

Summary

This chapter has described the steps to link strategic and human resource planning processes in Transport Canada.

The effectiveness of the HRP process is also dependent on the ability of Transport Canada to put into place the recommendations on human resource management developed by TPF&C and presented in its report on Phase Two of the project. These recommendations are crucial as their implementation will effect the "integrated approach" defined as the basis for the project. The recommendations are attached, for convenience, as Appendix Two.

IV. THE FORECASTING PROCESS

Background

An essential part of human resource planning is the forecast of the people needed to match the plan - which in turn is linked with the organization's long term plan. It is a tricky process - partly an art, partly a science. There are factors to consider inside the organization and in the surrounding world, now and in the future. Inevitably, one person has to gather these factors and make a decision. Each decision depends heavily on the judgment of the planner/forecaster, whether that person is a staff expert, an owner, or a manager.

The flowchart introduced in chapter two (see page 4) takes a practical approach to human resource planning. It assumes an overall plan and then asks "What is our total supply of people from all sources, against the total demand to meet the strategic plan?" People are seen from a supply and demand perspective, as is the case for any vital ingredient.

Forecasting begins with an understanding of the external (environmental) and internal (organization) conditions affecting future requirements. The analysis may result from the planning occurring as part of the strategic planning cycle or it may require independent review and analysis and, perhaps, in-depth studies. Some companies conduct or commission studies of changing conditions affecting human resource needs, such as causes and patterns of employee turnover, organizational structuring and job design changes, available labour supply (including availability of minorities and women in the applicable work force), legal and regulatory constraints and pending legislation, and technological changes affecting staffing requirements. At a very minimum, these various conditions are subjectively considered as a first step in the forecasting process.

The second step is to take an inventory of the talent available internally. Some organizations maintain "perpetual" inventories; thus this step involves examination of available information on current staffing, individual qualifications and appraisals, employee career interests, and employee development plans (targeted assignments, planning training and development). In other situations, the step requires collection of these kinds of data from the employees and their managers. A computer-based payroll administration system or broader-scope "human resource information system" provides valuable data-storage and reporting capabilities.

Through analysis of the current supply of talent (inventory), past patterns of change in this supply (such as mobility and attrition), and logical assumptions regarding future changes, managers can project the future available supply of talent in an organization. It is difficult, if not impossible, to predict precisely the future promotions, transfers, terminations, retirements, deaths, and other changes that affect the available supply of talent, but through this forecasting step, sufficiently reliable estimates may be derived for the purposes of human resource planning.

The fourth step of this process is the analysis of current human resource requirements. Staffing is usually controlled through control over organization structure, job definition, the number of authorized positions, and the budgeting process. An organization may not be optimally staffed currently, but an examination of demand, as it is currently defined, is the place to start in planning future needs.

Projection of current staffing (or ideal current staffing) to the future involves application of planning criteria or assumptions. Ratios or regression relationships between staffing and work load indicators are a commonly applied basis for projecting future requirements. As for projecting availability of talent, various mathematical techniques are available which are not commonly applied, but subjective managerial judgments are influential in actual demand forecasts.

Finally, the sixth step of the process calls for a matching or balancing of the net projections: future supply and future demand. The results represent needs for human resources indicating necessary actions, including recruiting, training and development, succession or job reassignment, and organizational adjustments. Specified needs, then, provide the link between identified issues relating to changing management conditions with the program planning aspects of the human resource planning process: performance management, career management, and management succession.

Models as an Aid to HR Planning

Models represent the essential features of the real world and are of two basic types - descriptive and normative. Descriptive models represent what is or the world as it exists now. The purpose in developing a descriptive model is to simplify complex and often contradictory data so that flows or patterns can be more readily discerned or understood. Normative models are a representation of someone's ideal, that is, they represent what should be according to some preconceived set of conditions, assumptions or beliefs. They are particularly useful for comparison of possible situations. The process is frequently called "reality testing" and the normative model is used to generate possible scenarios each of which arises from some change to the basic assumptions. In this way the effect of decisions can be seen without interference with the real world.

The essential purposes of modelling are multiple. Various mathematical techniques have been applied in varying ways to explore different aspects of human resource flows and needs. Techniques such as regression analysis, markov analysis and linear programming permit manipulation of important historical data which managers consider to be significant. Assumptions or parameters underlying system behaviour can be modified in models. Simulation techniques make it possible to evaluate the relative importance of the many factors that influence an organization's human resource needs and availability. Modelling enables managers to explore aspects of

systems that cannot be observed directly, such as the pattern of movements of employees among different sets of jobs in an organization over time and the reactions of internal manpower supply to changes in management policies and employment decisions. The affects of future policies, staffing and development actions and organizational changes may be examined and considered in formulating human resource plans. In the longer view, models may even be expanded and refined to the extent that they incorporate a variety of basic techniques in a combination operating as a complex entity simulation. In this form they become comprehensive organization-wide forecasting models.

The model described in the following section is an organization change model. It combines markov or stochastic processes, regression analysis and succession analysis. Before commencing a description of the model, we must sound a note of caution: models are not exact nor are they meant to be. Models are representations not exact monitoring devices. Modelling efforts frequently fail because they strive for absolute accuracy of prediction. One economic folk principle states "The moment you forecast, you know you're going to be wrong, you just don't know when and in which direction". The chapter on modelling in James Walker's book, Human Resource Planning, concludes with the following. "Finally, it is noteworthy that any forecasting technique merely provides more data. No technique known to humanity can provide a plan or prediction of what will happen in the future, yet the data provided by the techniques available are valuable for their increased objectivity. They provide an interpretation of available factual data for consideration by management. Nothing more and nothing less."(1)

(1) James W. Walker, Human Resource Planning, McGraw Hill, 1981

The Model Installed at Transport Canada

This forecasting model analyzes the expected internal supply, forecasts the demand for these resources by examining headcount as a function of output, related or economic variables and obtains potential gaps by comparing the two results.

1. Define generic job classifications: The basic unit of a forecast can be specific job titles, generic positions, functional areas, organizational units, Transport Canada as a whole, or some combination of these. The decision as to which unit is most appropriate should be based on the anticipated uses of the results of the forecast.

   Typically, job titles are too specific to be useful. The number of employees in particular jobs can be small; this does not facilitate analysis or statistical inference. Conversely, organizational units may provide large amounts of data, but forecast results may be too general to be useful.

   Generic job classifications or job families are usually the most appropriate unit for a forecasting model. To define the forecast, information is needed on typical tasks associated with each position as well as required skills and levels of skill proficiency. A listing of current job titles included in each generic job grouping is required for reference.

2. Develop A Headcount Matrix: Once generic job classifications have been defined, a headcount matrix can be constructed. This matrix arrays generic job groupings by either organizational or skill levels or both. The following format is typical.

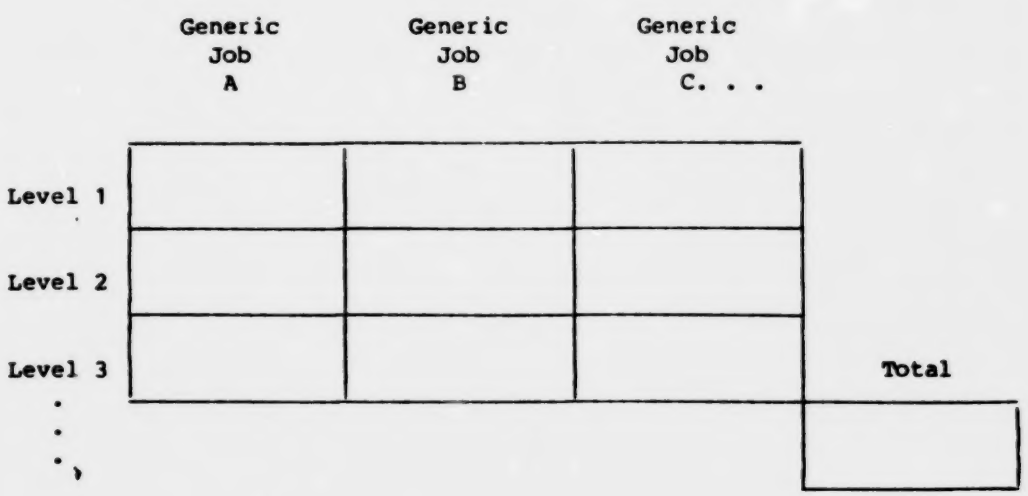


Figure 4: Matrix of Generic Jobs and Responsibility Levels

Four examples of generic job families within an engineering department are civil engineers, draftsmen, electronic technologists, and computer programmers.

Actual (existing) employee headcount can then be entered in each appropriate cell. An example of the resulting matrix is shown below:

	Generic Job A	Generic Job B	Generic Job C	
Level 1	3	2	10	
Level 2	5	7	0	
Level 3	2	1	0	Total
				30

Figure 5: Headcount Matrix

3. Develop a mix matrix: Once the headcount matrix has been completed, the mix matrix can be defined. Similar in format to the headcount matrix, the value in each matrix cell is the ratio of cell residents to total headcount, expressed as a decimal. For example, the sample headcount matrix would yield the following mix matrix:

	Generic Job A	Generic Job B	Generic Job C	
Level 1	.100	.067	.333	
Level 2	.167	.233	.000	
Level 3	.067	.033	.000	Total
				1.000

Where .167 is the ratio of Generic Job A, Level 2 headcount, Total headcount (5/30 = .167).

Figure 6: Mix Matrix

4. Develop transition matrices: Employee mobility is represented using a transition matrix. This matrix captures both movement between generic jobs and external turnover (employees lost to the external market). Data on movement into positions from the external market is not entered into this matrix. The following format is used:

To / From	Generic Job A Level 1	Generic Job B Level 1	Generic Job C Level 1	External	Row Total
Generic Job A Level 1					
Generic Job B Level 1					
Generic Job C Level 1					

Figure 7: Transition Matrix

Each cell of the headcount matrix (e.g., Generic Job B - Level 2, Generic Job C - Level 3) will appear as both a row heading and a column heading in the transition matrix.

Movement is recorded "From" a position in the row headings "To" a position in the column headings. By definition a "move" from one position to the same position is not a move; the number in this cell represents the number of employees who did not change jobs during the transition period (e.g., quarter or year). A move from a generic title to "external" is a move by which employees leave the system as defined. A row total represents the total number of employees in the given group at the start of the transition period. An example of this transition headcount matrix follows:

To / From	Generic Title A	Generic Title B	Generic Title C	External	Row Total
Generic Title A	20	10	2	2	34
Generic Title B	2	22	5	1	30
Generic Title C	1	5	11	0	17

Figure 8: Transition Headcount Matrix

Once headcounts have been entered, transition rates can be calculated. By definition the rate for each cell is the ratio of the number of cell residents to the appropriate row total. Thus, this number is the ratio of employees moved to the total number of employees in each generic position at the beginning of the period. Row totals ratio are not calculated.

The sample transition headcount matrix would yield the following transition rate matrix:

To / From	Generic Title A	Generic Title B	Generic Title C	External	Row Total
Generic Title A	.588	.294	.059	.059	1.000
Generic Title B	.067	.733	.167	.033	1.000
Generic Title C	.059	.294	.647	.000	1.000

Figure 9: Transition Rate Matrix

5. Perform internal supply analyses: Supply data is examined next. The framework for this analyses is the headcount matrix described in part 2. For the first period, actual headcount in each cell is known. Headcount for the subsequent period for each cell is calculated. For example, for Generic Job B:

initial headcount for Job B
\+ (transition rate from Job A) (headcount A)
\+ (transition rate from Job C) (headcount C)
\- (transition rate into Job A) (headcount B)
\- (transition rate into Job C) (headcount B)
\- (turnover rate) (headcount B)

Headcount B at end of the transition period.

The resulting headcount (end of period 1) becomes the initial headcount for the second period, and the process is repeated. This analysis is completed for each of the next five planning periods for each cell. The results for each period are displayed in one matrix for all positions.

6. Develop the New Hire Matrix

The new hire matrix is identical in format to the headcount matrix. It shows, by level within generic job classifications, those individuals who enter the defined organizational unit during one planning period, e.g. the new hires for the engineering department in 1981, in total, broken down by level and job family.

	Generic Job A	Generic Job B	Generic Job C	
Level 1	3	1	0	
Level 2	0	2	1	
Level 3	0	0	0	Total
				7

Figure 10: New Hire Headcount

The example in Figure 10 shows a total of 7 persons entering the organizational planning unit during the given planning period.

A new hire mix is calculated from the new hire headcount for use in forecasting new hires by cell.

The new hire headcount is added to the internal supply to produce a total supply.

7. Forecast demand: Demand is forecast directly for each cell. Rather, a total demand for the entire "community" as defined is produced and the demand for each generic position derived. Thus

(total demand for employees)(mix matrix)=demand for each cell

If, for example, 15% of the population is in Generic Job A, Level 1, and total demand is forecast to be 500 employees, it is expected that 15% of the 500 employees, or 75 employees, will be required in that position at that level.

Demand is forecast through the use of mathematical analysis such as multiple regression or polynominal curve-fitting. It is assumed that some relationship exists between headcount and such variables as:

- o production units, i.e. inspections performed
- o dollar volume of output or services, i.e. person years of service
- o number of customers, i.e. passenger embarkations

Headcount may also be related to secondary or economic variables such as:

- o GNP
- o population
- o disposable income indicators
- o transportation index

Data on these variables are entered into a computer and compared to headcount on an historical basis. Any relationships that do exist are defined; the strength of those relationships can, of course, be measured objectively. If, for example, a multiple regression model is used, it may be found that

HEADCOUNT =

A (inspections performed)
+B (passenger miles travelled)
+C (PDI)
+D (population)

where A,B,C, and D are regression coefficients defined by the analysis itself. Once this equation has been developed, forecasts or estimates for each of the variables for each of the forecasted periods (e.g., the estimated personal disposable income for 1982) can be substituted into the equation and a total demand headcount calculated for that period.

Demand for each of the subsequent periods is forecast in this manner using whatever formula is developed during the analysis. An estimate of demand for each cell of the headcount matrix is then determined using the procedure outlined at the beginning. Given the sample mix matrix and a total demand forecast of 35, the following demand headcount matrix would result:

	Generic Job A	Generic Job B	Generic Job C	
Level 1	3.5	2.3	11.7	
Level 2	5.8	8.2	0	
Level 3	2.3	1.2	0	Total
				35.0

Figure 11: Example of Demand Headcount Matrix

Fractions would be rounded to the nearest whole number.

8. Analyse results: Once internal supply has been analyzed the new hire headcount can be added to produce total supply for comparison with the demand forecast.

Projected demand/cell
less supply/cell

equals deficiencies anticipated personnel/cell

Since the analysis is done on a period-by-period basis, the personnel deficiencies/surpluses are for each period.

Once these calculations are made, changes can be made to ensure that realistic plans can be developed. If the number of new hires planned/calculated in this manner is deemed excessive in light of market conditions, several previous assumptions may be modified. For example,

- mobility rates into the positions can be increased - this may entail faster promotions, increased training and development, or promotion into "stretch" developmental positions.
- turnover rates can be reduced - this may require actions to increase motivation, improved working conditions, additional compensation, or improved benefit plans.
- the employee mix can be changed.

The number of jobs itself may also be changed. For example

- new generic jobs can be added to the model as required (e.g., adding Generic Jobs D and E)
- it may be determined that some number of employees are required for existing generic jobs at new levels (e.g., adding employees to Generic Job C at Level 2).

This type of analysis provides the basis for action planning. The costs associated with these actions can be estimated and the most appropriate course of action chosen. Management must examine such factors as

- the costs associated with recruiting
- the costs associated with turnover
- anticipated supply of qualified talent in the external market
- the costs associated with accelerated employee development

After this analysis has been completed and assumptions modified, matrix values can be changed and the model rerun. This is an iterative process. Assumptions may be changed and the model rerun until an acceptable scenario emerges, with the changes noted for their effect on actions to be taken in the "real world".

9. Additional considerations: A quarterly time horizon is typically most appropriate. This allows for seasonal changes and maximum flexibility. The model should be run for one period, forecasting each of the next eight periods. If, however, sufficient quarterly data is not available, an annual process may be sufficient.

The Initial Transport Canada Application

The forecasting model was applied to the Transport Canada situation with little modification. The most serious difficulty was the availability of historical information to use in the development of the transformation matrix and for the demand forecast equation.

1. The Generic Positions: There are 755 engineering positions in Transport Canada. In terms of engineering disciplines these are split as 291 civil, 297 electrical, 87 mechanical, 69 aeronautical and 7 marine engineers. The first task in constructing the Transport Canada model was to define generic job families which would split these broader engineering disciplines into broad groups represented of the interchangeability liking to be found in on-the-job practice. For example, should the electrical engineers working in the ILS program be defined as a generic job family or are the qualifications for these jobs such that the engineers could move to another specialist sub-group with ease. A frequently applied rule of thumb was whether or not the length of time to make the transition was less than or equal to the equivalent amount of time to recruit for the same position.

   Workshop sessions were held with each of the Transportation authorities. Working directly from organization charts, project team personnel and engineering managers developed the generic job families for the model. The other dimension of the matrix is the Transport Canada classification level.

2. The Headcount Matrix: For a variety of reasons, the most significant being the government budgetary cycle, the initial headcount was based on the engineering population of 1st April, 1981. The computer printouts forming part of the project working papers include headcount matrices for other points in time.

3. The Mix Matrix: The mix "matrix" is calculated by "running the model" or, in other words, it is part of the Transport Canada model software.

4. Transition Matrices: Lack of historical information was an obstacle which had to be overcome in developing the information for the transition matrix. The actual matrix was defined by arraying the generic job families and levels against themselves as described in the previous section. The actual headcount for the transition matrix was a different matter. Ideally, the transition rate trend for any particular cell would have been calculated over a period of five or more years but the data was unavailable. Information on transfers, promotions, and so forth, could be obtained with accuracy for only the past two years and this constitutes almost a point estimate. The output takes the form of a list, cell by cell, showing "from-to" data for all possible transfers. These printouts form part of the project working papers.

5. Analysis of Current Supply: When the distribution of Transport Canada engineers by specialty and region was arrayed as a headcount matrix, it became a "snapshot" of the Transport Canada engineers by job family and level as of April 1, 1981. When this headcount was "aged" by operating on the initial headcount with the transition matrix, the result was a headcount for these same job families and levels as of April 1, 1982. Recall that the construction of the model is such that, to this point, new hires had not been entered into the matrix. In other words, by aging the information dated April 1981 using assumptions that turnover and transition rates would remain constant, we forecast the internal supply for any other point in time. This can be continued for as many iterations as required.

6. Demand Forecast: The scarcity of historical data was a problem in developing the total demand forecast equation as it was with the transition matrix. The initial trials attempted a regression of the number of filled positions, in other words the population of engineers, against a variety of socioeconomic indicators. The correlations obtained were such that the total demand forecasts could not be considered to be highly reliable. The next attempts employed the number of defined engineering positions whether they were occupied or not. Again, the results were disappointing. The final trials used the rate of change from period to period and in this instance the model produced relatively satisfactory results. The correlations obtained are high enough that the total demand forecasts can be considered reasonable, although not totally satisfactory.

As the PMIS gathers information and experience it can be added to the transition matrix. This aspect of the model will improve over time and become more accurate in the way in which it can forecast personnel movements within Transport Canada.

V. SUMMARY

The concept of integrated human resource planning and development as described in this document is a departure from traditional approaches to the process. First, there is an emphasis on the inclusion of all aspects of human resource management as a contribution to the provision and preparation of human resources. Secondly, the emphasis on a linkage between strategic planning and human resource planning is a key concept in this document. Both aspects, linkage to strategy and integration of HRM processes, are fundamental to effective human resource planning and development.

APPENDIX ONE

A SUGGESTED FORMAT FOR

THE HUMAN RESOURCE PLANNING GUIDE

THE HUMAN RESOURCE PLANNING GUIDE

The HRP Guide is a simple method of defining the key elements to be considered when undertaking Human Resource Planning. It consists of a series of steps relating human resource issues to long range plans. These broad areas are included:

- A review of long range plans - the human resource implications of planned expansion, contraction, or other changes indicated in the strategic plans.
- A review of the external factors - the effects of other government departments, legislation, union activity, and human resource availability.
- An analysis of internal personnel issues - the implications of turnover, employee mix, performance patterns, grievances, and so forth.
- A consideration of management implications - the changing managerial staffing needs and management skills required.

It is a definition of HRP: How to ensure the right number of people, of the right kind, doing the right things, at the right time, all with a view to accomplishing specific goals. It is a planning guide for thinking about what you and your organization intend to do (the strategic plans) and the people side of those plans (the human resource implications). The planning guide assumes that you have made some fundamental decisions. It should mirror the "corporate plan" and show the major effects on time, money and people.

How to Complete the Guide

The guide begins with a simplified version of an organization chart - there are no interconnecting lines or titles, nor are there divisions by service areas. This chart, shown on the following page, is meant to capture the names and designations of the key decision makers in your department. Each of these supervisors or managers shares in the responsibility for human resource planning and has a key role to play in developing both departmental and overall plans.

HUMAN RESOURCES PLANNING GUIDE

MANAGEMENT STRUCTURE

1. Who is the senior decision maker - the person to whom you report? Include his/her designation, i.e. ADMSP.

Name:

2. Enter your name and position.

Name:
Position:

3. Are there staff (non-line) people reporting to you; e.g., personnel, legal, research, etc.?

1. 2. 3. 4.

4. Who has the major responsibilities at the next level - reporting to you as Department Heads, Managers, Supervisors, and so forth? Name the key people reporting to your position.

1.	2.	3.
4.	5.	6.

Once the individual who is responsible has been identified, this manager considers each question in the planning guide and notes pertinent factors, observations, or assumptions. Questions that are not considered pertinent should be deleted, and additional questions should be added where appropriate. This is intended to be a "workbook" to direct and stimulate management thinking, not a rigid procedure.

The Long-Range Plan

The planning guide commences with a series of questions about the Department's long-range or strategic plan. The questions, in part (A) of the planning guide, are not meant to be a substitute for a full and detailed strategic plan. If a plan does not exist in a formal sense, then answering these questions will produce the key parts of a plan as it relates to human resources.

There are seven questions. The last is a summary that collects the effects of all the planned changes. The list is not exhaustive - you can easily add a planned activity which is particular to your area. Each line in the summary shows the dollars planned for a particular service, group of services or project. In other words, it is a quantified set of goals or objectives. Each has a human resource component.

Demand for Human Resources

The manager's first task after the departmental targets have been set, is to see the dollars or units of output in terms of the people to produce them. These staffing implications are the "demand" side of the process - the number and kinds of people needed at particular points in time to meet the goals and objectives that flow to the department from the strategic plan.

You will find a forecast demand by level and general job family attached. It is an output from the PMIS model and predicts demand based on assumptions of activity levels - you should modify this forecast after careful study, by comparing it with your predictions based on changed levels of activity.

Supply of Human Resources

With the total demand established, the manager can consider ways and means to meet it. The next two parts of the planning guide take the manager through a series of thought provoking questions on the internal and possible external sources of people. The external analysis (Part B) cannot be as accurate nor as factual as employee records, but it does raise the issues most likely to affect human resource planning. On the internal side, the emphasis is on collecting and organizing information which you have at hand - in personnel files, in project data, and so forth.

Part C examines six major supply problem areas, but in completing this section the manager should add or subtract areas to reflect the situation in his or her particular working group.

A forecast supply, an output of the PMIS computer model, is attached. It is a forecast on the assumption that turnover rates will remain as they were in the previous fiscal year, that hiring rates will also reflect last year's experience, and that promotion and transfer policies remain constant. This is a projected supply for the start of each of the next two years. You should modify this where your known supply is different from that on the printout. In other words, if a given level in a given generic family shows a projected 11 persons and you now have 12 with two persons expecting to retire this year, then the model has not had access to accurate information and you must correct the printout.

The "management implications" portion of the guide (Part D) is similar to the internal assessment except that it asks some hard questions about the managers - the same ones that filled the blanks on the organization chart. The "ripple effect" of a promotion can be seen easily from this exercise and, of course, the vulnerable places can be spotted in time to take corrective action. Ultimately Part D will be used to modify the total HR plan when it has been compiled.

Summary

By completing these documents you will provide invaluable information which will become a major input to the work of the Strategic Planning Task Force as it prepare the Group Planning Overviews.

Ultimately, as the Budget Operational Plan is prepared, it will have taken into account the long-range or strategic goals of Transport Canada, direct feedback from line managers such as yourself, and the human resource plans which form part of the Group Planning Overviews.

Thank you for your cooperation and assistance.

HUMAN RESOURCES PLANNING GUIDE

A. REVIEW THE LONG RANGE PLAN

(1)

Planned addition(s) of new facilities	Budget
New space	
New equipment	
Major maintenance	
Other	

(2)

De-emphasize or discontinue any activities?	Budget
Services discontinued?	
Major project(s) discontinued or completed	
Territories, regions, cities	
Other	

(3) New products or services added?

Item	Budget Implication				
	Next Year	Ensuing Years			

(4) New Projects

Project	Budget Implications					
	Next Year	Ensuing Years				

(5) What are your opportunities for changes in operating methods or productivity improvements?

Opportunity	Estimated Savings	Timing			

(6) What other changes do you plan?

	Effective Date	Dollar Effect
		$ $ $ $ $ $ $ $ $

(7) Summarize the effects by block from the previous questions

	Budget Implications					
	Current Year	Next Yr.(1)	2	3	4	5
(1) New facilities	$	$	$	$	$	$
(2) Completions	$	$	$	$	$	$
(3) New services	$	$	$	$	$	$
(4) New projects	$	$	$	$	$	$
(5) Methods improvements	$	$	$	$	$	$
(6) Other changes	$	$	$	$	$	$
	$	$	$	$	$	$
	$	$	$	$	$	$
	$	$	$	$	$	$
	$	$	$	$	$	$
	$	$	$	$	$	$
(7) Summary of changes	$	$	$	$	$	$
(8) Existing or previously planned budget	$	$	$	$	$	$

B . REVIEW THE EXTERNAL HUMAN RESOURCE SUPPLY FACTORS AS YOU SEE THEM

1. Are qualified (competent) recruits available in the market?

2. (a) Are you able to recruit competitively?

   (b) What major competitor(s) will hire strongly in the next year/two years/three years?

3. Do you have problems getting people to move to your city or province?

4. Are there changes in the personnel relations climate? Has there been a labour dispute which will affect your area?

5. Are there new affirmative action requirements?

6. Are there new regulatory requirements affecting human resources? Health and safety standards? Workmen's Compensation Board?

7. Are there government political initiatives available which will affect your area?

8. Are there Canadian or international business demands which will affect your supply of talent?

9. What other issues will affect the external supply of human resources?

C. ANALYSE YOUR INTERNAL PERSONNEL

1. Do you have excessive turnover in any group? Complete as "number who left/number in this class," either as a ratio or a percentage.

Level and Generic Family	Turnover				
	1977	1978	1979	1980	1981

2. a) List the labour contracts by union, number of people under contract, and expiry date of contract. Identify any expected problems for the next negotiation.

   b) List the grievances by level, department, and union local for the past year, and the outcome of each.

3. Are age patterns imbalanced in any group, suggesting high future attrition or career path blockage?

Level and Generic Family				
	Up to 24	25-34	35-44	over 54

4. In your opinion, is there a proper balance (employee mix) of managerial, professional/technical, and supporting personnel in each group? Are you "thin" in talent in your department? What is the most serious shortage?

5. In what areas are levels of technical competency a potential shortcoming?

Level and Generic Family	Existing Supply	Needed Today	Needed Next Year

6. What other issues are likely to affect the employee pool and its ability to meet your goals? e.g.:

   a) What is the rate of absenteeism? What does it cost and what can be done?

   b) Are there alcohol or other drug problems in the work force?

   c) Are there any other performance related problems?

D. CONSIDER THE MANAGEMENT IMPLICATIONS

1. Are there enough employees who could be promoted to the next level? List the supervisors and managers and determine the possible successor(s).

Position Title	Name of Encumbent	Possible Successor(s)	Comments on Readiness

2. Do the present managers have adequate technical competence in the face of changing demands? List those persons and the areas of training needed to keep pace.

3. Do they have adequate manager skills to meet changing demands (leading, planning, decision making, etc.)? Assess each manager/supervisor on a scale of 1 to 10.

Name	Assessment	Notes

4. Do key managers and successors have adequate management experience (multiple function exposure)?

Manager	Functional Experience (Years)	Successor	Functional Experience (Years)

Example: John Doe
Strategic Planning (4)
Human Resource Planning (2)
Classifications (1)

In other words, J. Doe has seven years of varied experience.

5. Other issues which affect the manager levels:

APPENDIX TWO

AN ACTION PLAN TO

ADDRESS THE HRM ISSUES

APPENDIX TWO

AN ACTION PLAN TO ADDRESS THE ISSUES

The HRM issues and recommended actions from the pilot project are described below.

1. Human resource planning, as defined in this report, is not an integral part of the strategic planning process.

   a) Recommendation: change the process to develop the strategic planning guidelines to include the integrated human resource planning approach described in this report.

   - o Add the ADMP, or a designate, to the group working with the ADMSP to develop the strategic planning guidelines.
   - o Require the human resource planning group to prepare strategic human resource planning scenarios as input to ADMSP in advance of the strategic planning guideline process.
   - o Cross appoint one or more human resource planning experts to ADMP/ADMSP.
   - o Consider the appointment of an external advisory council or committee of 3 to 5 persons familiar with all aspects of the human resource supply/demand situation to provide input to the strategic planning guidelines. The Burns Committee which advises the Treasury Board is an excellent example.
   - o Require that the planning process for any project specify human resources by number, level and job title. This could be accomplished by stipulating this requirement as the Approved in Principle Document (APD) progresses to become a Project Approval Document (PAD).

2. Human resource management responsibilities and activities must be defined for all management levels.

a) Recommendation: define the specific human resource management responsibilities and activities which are part of each manager's role.
   - o Undertake job analysis and responsibility reviews to define these responsibilities and activities.
   - o Clarify, through training and development, the HR management aspects of the managers' jobs.

b) Recommendation: evaluate each manager's performance in managing his or her assigned human resources.
   - o Include HRM activities in the annual goal setting exercise.

c) Recommendation: support the managers in their human resource management roles through the provision of human resource planning and development information and reports derived from the personnel management information system. Further support may be required through assistance provided by internal consultants from the Personnel Department.

d) Recommendation: require that project managers estimate the human resources for all projects at an early stage.
   - o Require an estimate of number, type and level of personnel as an ADP progresses to a PAD.
   - o Provide information on previous projects of a similar kind as an aid to the manager estimating the person years for a project.
   - o Provide technical support in human resource forecasting from the human resource planning group.

e) Recommendation: require each manager on an annual basis to estimate the supply/demand facing his group with supporting assumptions and information.

- o Design and implement a simple and easily processed manual document which can be used as an input document to PMIS for compilation and reporting.
- o Provide the compiled information to the ADMP or a designate as an input to the process developing the strategic planning guideline.

3. The staffing process must be improved to the point where it can compete effectively with the private sector.

a) Recommendation: develop information packages to describe the unique engineering careers within Transport Canada.

- o Assign the development of the information package to a select group of engineers.
- o Link the information developed to a career planning process.
- o Require all staffing officers to complete a training seminar on Transport Canada engineering careers prior to commencing duties. Such a training process should be delivered by engineering managers.

b) Recommendation: develop information packages prepared specifically for university recruiting.

- o Provide comparative salary and career information.
- o Resolve or explain in a detailed and reasonable manner the Public Service Commission's inability to make offers for actual positions.

c) Recommendation: develop a team recruiting process involving an engineering manager with a broad knowledge of career opportunities in Transport Canada at an early stage in the negotiations with all potential candidates.

- o Select only the most able engineering managers for this duty.
- o Treat this responsibility as a priority item suitably reflected in the time allowed for its accomplishment.
- o Link the engineering managers' staffing responsibilities to the goal setting and review program.
- o Rotate the responsibility amongst engineering managers on some short term basis, i.e. six months.

d) Recommendation: provide specific incentives to Transport Canada engineers to be highly involved in non public service activities which provide better public understanding of the role of engineering within Transport Canada. Such incentives could include paid memberships in associations, travel allowances to present papers, time to attend conferences, and so forth.

4. Career Planning must become more than a buzz word. In organizations where effective career management programs have been implemented, they have become one of the most highly successful tools for the retention and motivation of personnel.

a) Recommendation: design and implement a specific Transport Canada career planning program. The component parts should include a job catalogue, descriptive information on career paths and an individual career planning workbook for the use of all personnel. Since we do not expect that this difficulty is restricted to engineers, this recommendation should be considered for the entire department.

5. The total compensation package (direct compensation, benefits and perquisites) must be maintained at a level which is at least competitive with the private sector for engineers of a type and quality matching the objectives of Transport Canada in both the short and long term.

   a) Recommendation: review the results of the most recent contract negotiations to ensure that the implications of new salary levels, bonuses and classification levels place Transport Canada in a competitive position.

   b) Recommendation: develop specialist positions to reward and retain engineers in these categories.

   c) Recommendation: provide all engineering managers with ongoing comparative information on total compensation packages within the public service and externally.

   d) Recommendation: design individual employee benefit statements and provide these to all employees as an automatic communication at least every six months.

6. Job analysis was not a specific mandate of the Human Resource Planning study but there were indications throughout that shifts in emphasis were taking place.

   a) Recommendation: examine the feasibility of organizing departments on a project basis to obtain higher levels of synergy from the mix of engineers, technicians and support staff in the team.

   b) Recommendation: examine all engineering positions below the ENG-4 level to determine whether or not some positions might be split or otherwise reclassified from engineer to technician or a combination of technican and support staff. At the same time, this study may be expected to reveal parts of engineering jobs which could better be undertaken by non engineers thus providing more time for the engineer.

c) Recommendation: undertake a project to develop strategic position profiles to define the role of engineers in Transport Canada in five years and in ten years.

7. Training and development programs must match the specific needs of the engineering group more closely.

a) Recommendation: undertake a program of needs analysis preparatory to developing specific programs to offset technological obsolescence. This is an ongoing requirement and will require input from the engineering managers themselves. Staff work will be necessary but direct input from a training and development committee is highly recommended.

b) Recommendation: design and implement a project management training program specifically for Transport Canada engineers.

Certainly, this is a formidable and daunting list. A frontal assault could lead to disaster and the comment "see, I told you that human resource planning wouldn't work in the federal government".

It is absolutely essential that the remainder of this project concern itself with a careful review to establish more exacting dimensions and to determine priorities from the list. The accomplishment of these two steps with the enunciation of the specific tactics to implement these strategies will complete the work of this project.